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THE FRENCH EXPERIENCE OF PELVIC FLOOR REHABILITATION

WITH BFB AND FES

THERAPEUTIC METHODS FOR PELVIC FLOOR FUNCTIONAL REHABILITATION

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OBJECTIVES & METHODS

Introduction
Objectives & methods for rehabilitation

Rehabilitation of the pelvic floor dysfunction was started at the end of the 70's by some French therapists of whom the first was Alain Bouncier.

Intra vaginal & anal stimulation increase urethral pressure profile by activating nerves to the striated pelvic floor and para-urethral muscles. It has been demonstrated that the pathways involved are similar in both humans and animals although the influence of the sympathetic nerves on the bladder may be less important. The smooth muscle component contributes also to a good urethral pressure profile.
Pelvic floor rehabilitation aims to restore proper function of the perineal musculature through pelvic muscle education and/or re-education.
Patients need to learn and practice pelvic floor exercises in clinic with the therapist and to follow up at home.
One also uses behavioural techniques for bladder or faecal control as well as for pelvic floor blocking while standing.

Rehabilitation is therefore used to treat lower urinary tract and terminal bowel dysfunction using physical therapy for the pelvic floor.

Factors limiting rehabilitation

Some factors limiting successful rehabilitation.

1- Body weight is an important factor influencing results because of the pressure generated downwards by viscera - chronic coughing is another - and also poor posture.
2- Motivation for re-education is one of the most important factors. Without strong motivation it is more difficult to obtain a good result.
3- Testing of the pelvic floor muscle; the first evaluation before starting a re-education plan can predict good results or not.
4- Chronic coughing because of the pressure downwards.
5- Women doing physical fitness training such as aerobics, body building, tennis and hard footing, is evidently a limiting factor.
6- Finally urodynamic data depending on the degree of sphincter damage, striated insufficiency, bladder dysfunction, and so on, may help us to define the limits to rehabilitation.

Appraisal of perineal risk

Before starting rehabilitation one has determine whether any perineal risk exists, For example:

1- family history
2- Childbirth: parity, dystocia, too quick a delivery of both large and small babies.

3- pelvic floor examination : tight vulva, narrow vagina, thin fibrous nucleus, thin levator ani, short ano-vulvar distance, straight muscle diaphragm, fat infiltrated pelvic floor, tissues made fragile by vulva-vaginal inflammation, hypertonic pelvic floor with levator ani spasms and reflex contractions, ischio-pubeous branches abnormally parted
4- physical and daily living factors
5- history of urogynaecological surgery

Objective of physiotherapy

Physiotherapy has to restore perineal function by re-educating the pelvic floor musculature: manual techniques, biofeedback and electric stimulation, postural gymnastics.
Physiotherapy has to restore bladder control using bladder training techniques.
Physiotherapy has to guide and advise patients on incontinence aids, precautions and at sometimes social change.

Female pelvic floor disorders Physiotherapy (Ph)

What are lower urinary tract abnormalities improved by physiotherapy techniques?
1- genuine stress incontinence
2- urge incontinence
3- mixed incontinence
4- nocturnal enuresis
5- voiding difficulty
6- retention
7- weak pelvic floor function
8- PF pain in dyspareunia

Who can benefit from Ph

1- post-natal period for women
2- patients with pelvic floor dysfunction desiring another pregnancy
3- patients who prefer to delay surgery
4- patients with moderate discomfort
5- patients with failed surgery

PELVIC FLOOR REEDUCATION...

Pelvic floor re-education must not be confused with gymnastics. It is not only a simple repetitive movement to reinforce a muscle.

Treating the whole pelvic area

Before re-educating the pelvic floor one has to keep 4 steps in mind :

1- The quality of the levator ani muscles: it is really important to block the pelvic floor when straining.
2- The importance of the integrity of internal pudendal nerves, erector & hypogastric nerves, perineal nerves, ensuring the right reflex mechanism to control pelvic floor musculature.
3- The importance of the inter-relationship between perineal nerve damage and pelvic floor control.
4- Childbirth & the effect on the pelvic floor knowing the relaxation action of the pelvic floor musculature.

One understands consequently that a multidisciplinary approach can lead to a complete understanding of pelvic floor dysfunction.

Some epidemiological studies demonstrate a higher prevalence of PF dysfunction in younger women. However we also know that urinary incontinence is not the only pelvic floor disorder. We know that faecal incontinence is a problem affecting predominately but not only elderly people. Middle-aged and even younger patients need treatment. We know too that chronic constipation is a common female disorder.

Last but not least, pelvic organ prolapse is a common pelvic floor dysfunction.

Reeducation of pelvic floor musculature

Usually we have to follow four stages:

1- informative : information about PF physiology & anatomy
2- Awareness of pelvic floor muscles: finding out whether front, middle and rear PF voluntary contraction is present with or without synergy.
3- Strengthening of pelvic floor muscles: by exercises and neuro-muscular electrostimulation.
4- Reflex pelvic floor contraction: with teaching perineal blockage before stress.

About reflex PFM contraction; the patient must be made aware of constant contraction of the pelvic floor during daily activities e.g. upright position, movements, lifting, carrying a load, and so on...

About perineal blockage before stress; the patient must be taught that pelvic floor muscles must be contracted before the abdominal pressure rises e.g. coughing, sneezing, running & sport. To control PF blocking with stress one uses EMG biofeedback in standing up position with a special probe inside the vagina.

To understand the visceral mechanism and the importance of perineal blockage, one has to remember that the vertebra should not deform and that the diaphragm undergoes only slight variations.

Conservative treatment

First of all conservative treatment we have to keep in mind that:

1- Women need to be informed that physiotherapy is available, and that symptoms can be alleviated if not eradicated.

2- Physicians & doctors should be encouraged to question patients about bladder, bowel habits and any sexual problem, and to practice regular examinations to detect early signs of pelvic symptoms needing rehabilitation.

3- Patients have to be advised to undergo pelvic floor rehabilitation.

Reeducational techniques

To rehabilitate the pelvic floor muscles one has at our disposal:

- improved Kegel's exercise programme
- therapeutic gynaecological exercises
- functional neuro-muscular electric stimulation
- biofeedback therapy
- behaviour therapy

Management techniques

1°) - manual & instrumental pelvic floor function **evaluation.**

2°)- manual, postural & pelvic floor muscles **exercises**

3°) – NMS -**neuro-muscular electric stimulation** & BFB - **biofeedback training**.

Stimulation: we apply stimulation therapy in the clinic, hospital, and for homecare, we use programmable home units with daily or long term stimulation.

Using biofeedback training we have standard EMG & pressure BFB in office and apply pressure BFB at home.

1- Manual & instrumental PF evaluation

Unskilled work on muscles of the vaginal sidewall (puboccygeous, ilio and ischio-coccygeous) may be difficult because of the anatomy - the direction and the insertion of these muscles. Therefore any therapist who wants to provide complete and successful therapy must first learn to feel the vaginal muscles and to be able to evaluate them against a proper functional anatomy.

The PF contraction evaluation must evidently be the most complete and perfect possible with verbal orders. That means that the patient has to understand what we are asking for. Any functional disorder may reveal a bad body message, such as antagonist or agonist synergies, a reverse perineal order...

The therapist should not be satisfied by only a simple and total pubo-coccygeous and pubo-rectalis contraction. This is usually the case when giving a grade for the test. The therapist should also evaluate each part of the pelvic floor muscle branches, front, right and left, looking for any hidden tears, any muscle ruptures, or any P.C. asymmetry.

The manual appraisal of the PF musculature therefore allows the establishment of a subjective measures for:

External Vaginal muscle capacity for closing
Vaginal and central nucleus fibrous tonicity
Fatigability with repetitive contractions
Rapid contraction capability
Duration of the contraction
Synergies – agonist & antagonist

Then an objective instrumental evaluation – EMG & pressure - of the reflex and voluntary contraction, will be correlated to the manual evaluation.

This allows for management of progress in the future.

2- Manual, postural & Therapeutic gynaecological exercises

Exercises against manual contra-resistance, daily voluntary contractions, reinforce PF musculature improved by Kegel's exercises.
Postural exercises may help to reinforce the pelvic floor muscles by avoiding excessive downwards pressure.

Manual exercises are simple and easy:

Technique 1: The index finger is used easily and can evaluate the quality of the pubo-coccygeus on right then on the left, at the same time one applies a pressure (contra resistance) on the muscle asking the patient for a voluntary contraction.

Technique 2: For the bulbo-spongious muscle one proceeds by introducing the index and middle fingers into the vaginal opening (vulval entrance), palm downwards, then part the fingers asking the patient for a contraction, opposing a resistance when closing the vulva. It can help the imagination by asking the patient pretend she has two sliding doors to close.

Technique 3: for an antero-posterior position, one introduces the index and middle fingers into the vaginal opening (vulva), the middle finger in contact with puborectalis and the index

with the external inferior part of the urethra, under the urethral opening. Therapist parts the fingers and the patient is asked for a contraction opposing the resistance of the fingers. Urethral sensitivity may give the patient a better feeling of her contraction.

Technique 4: The appraisal of the puborectalis is easier and therefore more effective. It is better to operate with the therapist's inch upon the muscle, the palm face of the hand and the other fingers palming the sacrum, the patient relaxing herself on. This muscle can then be worked usefully, in concentric, eccentric therefore in pliometric (one after the other successively) and lateral right and left.

Postural exercises have different objectives:

a) To keep the spinal column stretched - maximum distance head/coccyx - whatever the position
b) To make its efforts while expiring upwards without preliminary inspiration.
c) To begin to expire by an increasing pelvic floor activity, maintained and increased during the effort
d) To begin the contraction by transverse, then oblique, eventually the rights, from bottom upwards to climb up pelvic visceras
e) To never push down to the bottom, let the coasts/diaphragm going down in the efforts and during the exercises
f) Not to shorten the rights, not to let them either too much lengthen (Lordosa camber)
g) Appraisal of the rights into isometric contraction

This technique is usually used at the end of the re-habilitation program allowing the patient to control the reflex and the voluntary PF blocking when moving, coughing, and squeezing, etc... This has limited success with older women.

Kegel exercises:

They are well-known and we have to remember to exercise tonic and phasic contraction muscles, numerous times in the day-life.

A pelvic floor exercise programme may include:
- daily Kegel exercises
- pelvic floor exercises with vaginal cones

Technique 1 – exercises must be simple and easy to perform at home and in the daily life :
- one contraction hold for 5 seconds
- 5 quick contractions
- 10 second rest
- This must be done 10 times X 3 times a day

Technique 2 – when the patient is able to exercise easily we may double the exercise time:

- one contraction hold for 10 seconds
- 10 quick contractions
- 20 second rest
- this must be done 10 times X 3 times a day
- then 6 times a day

3- Physiotherapy

3-1: **neuromuscular electric stimulation**
3-2: **biofeedback training**.

3-1 Therapeutic aspects of intra vaginal stimulation

- The position of vaginal or anal electrodes is very important. With vaginal electrodes it has been demonstrated that there is correlation between position and maximum urethral closing pressure (MUCP) if the electrode is on the muscle during stimulation. The best responses are obtained with electrodes in close proximity to the voluntary muscles of the pelvic floor (PC – IC) and to the pudendal nerves. The contractile response is always greatest when the electrodes are in close contact with the musculature of the levator ani.
- The surface of the electrodes should be sufficient to allow an effective action with a minimal loss of electrical activity. We consider, for vagina, 5 mm2 is the smallest to be effective. Ideally 15 mm2 should be used bearing in mind the width of the muscle branches. For anal stimulation 10 mm2 are sufficient.
- The shape of the electrodes is also important: too large electrodes (like bars) aren't necessary the best, covering too much the muscle zone.

Effect of Functional Electrical Stimulation - FES

Electric parameters are those recommended by the Northern school: M. Fall, Erlandson, Carlsson, Sundin & Eriksenn.

In both intra-vaginal or anal stimulation, we know that neuromuscular stimulation of pelvic floor musculature – **low frequency biphasic stimulation** zero net D.C. – both inhibits the bladder in urge incontinence, and increases the urethral pressure profile in genuine stress incontinence, by reflex action, depending on the frequency used.

- **Stress incontinence** : 50 Hz
- **Urge incontinence** (bladder inhibition) : 10Hz
- **Mixed incontinence** : 20 Hz or double associated stimulation 5O Hz – 20 Hz

Interferential technique may be also used with alternating pulse using 3.000 / 4.000 Hz modulated 5 - 10 Hz for urge incontinence, and 3.000 / 4.000 Hz modulated 50 - 70 Hz for stress incontinence.

Other side effects of the FES are:

- to increase of the strength of the pelvic floor muscle
- to improve the urethral sphincter response
- to involve an element of conditioning
- to reduce and/or cure PF pain such as dyspareunia

Contra indications - when not to use F.E.S.

One has to indicate some contra-indications:

- during pregnancy or if the chance of pregnancy exists
- during menstrual period (it is mainly a psychological contra-indication)
- when there are symptoms of urinary tract infection or vaginal infection
- when there are symptoms of atonic bladder (because of high compliance), urinary retention, uretheral reflux
- demand pace maker
- cancer
- total denervation
- non menstrual bleeding
- exteriorised hysterocele

The coil is not a contra-indication because we use biphasic wave with zero DC

3-2 General biofeedback therapy

Biofeedback therapy has different objectives:

1- to identify the pelvic floor function & the pubo-coccygeus muscle
2- to appraise the pelvic floor muscle relaxation and act on the information
3- to release chronic pelvic tension
4- to correct a reverse perineal command
5- to integrate the correct perineal blocking before stress

Biofeedback in urological disorders

Objectives for BFB in urological disorders:

1- to acquire an increased awareness of patients voiding pattern
2- to train muscles involved in the continence mechanism

Definition and goals of biofeedback

- To detect, show & measure internal physiological events
- To teach, promote & develop conscious control over body processes

So goals are:
- physiological self regulation
- development of new habits or responses
- an improvement of patient's life

Applied biofeedback

The previous learning process for these goals is:

1- **To develop** levator ani contraction before any rise in abdominal pressure using two biofeedback channels e.g. a vaginal and an abdominal at the same time, with EMG recruitment, or with pressure biofeedback.

2- **To perform** EMG exercises in a standing position to control reflex PFM contractions and voluntary PFM contractions.

3- **to adapt** the programme to meet the women's requirements

Biofeedback must be relevant in order to enhance learning and to focus attention on agonist *(pelvic floor muscles)* and antagonist muscles *(abdominal muscles).* Therapy concentrated on inhibition of the antagonist while attempting to increase the response of the agonist (pubo-coccygeous and puborectal), whilst contracting the external anus sphincter by observing the proper channel of the EMG tracing.
We know that once movement occurs, the EMG force relationship depends upon the speed of contraction and the length of the muscles involved.

Since the objective for performing the contraction is to contract the striated muscles properly, the proprioceptive signals generated by the muscles surrounding the pelvic floor can easily be misinterpreted as originating from the pelvic floor itself rather from the antagonist muscles represented by strong abdominal muscles. This incorrect manoeuvre perpetuates the substitution pattern and delays the development of an increased awareness of the isolated pelvic floor muscles. Another problem occurs when abdominal substitution pattern develops and is used when attempting to "hold back". This abdominal contraction with the incorrect manoeuvre of pushing down, described as a "**reverse perineal command»** causes a rise in intra-abdominal pressure. In that case, with such recruitment, this contraction would only maximize a rise of intra-abdominal pressure, which would increase EMG abdominal signals.

Abdominal muscle contractions are measured by widely spaced surface electromyographic electrodes. For this reason, we do not recommend home exercises during these early weeks of treatment, knowing that patients could reinforce the inappropriate response by antagonist muscles and extinguish the appropriate response. As soon as the patient is able to contract the pelvic floor muscle, we ask her to position her hand on her abdomen to feel the faulty

abdominal contraction. This is a complementary and a very simple exercise similar to Kegel's exercises for women.

With biofeedback therapy, information provides the patients with a method:
- To acquire voluntary control over skeletal muscle such as anal sphincter and / or levator ani muscles;
- To enable patients to develop a heightened sensory awareness of the pelvic function;
- To increase active muscle contractions;
- To decrease general muscle antagonist spasms when pain is associated;

The benefits of biofeedback therapy are rapidly obtained by most patients. The procedures involve minimal medical risk.

Conditioning techniques bladder

- to give a clear description of normal voiding function
- to restore the individual confidence in voluntary ability to hold urine
- to re-establish a more normal pattern

Algorithm for physiotherapy management

Regarding the PFM we quote the pubo-coccygeus contraction in a range from zero to five, e.g.: score = 0 = weakest / score = 5 = strongest

- **score 0,1,2** =
  Genuine Stress Incontinence = clinic therapy (FES), BFB, PFM
  Urge Incontinence = BFB, home treatment (FES)
  Mixed Incontinence = BFB, home treatment (FES) & PF Muscle Exercises
- **score 3,4,5** = BFB control blocking, PF Muscle Exercises & cones

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